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Fig. 1.

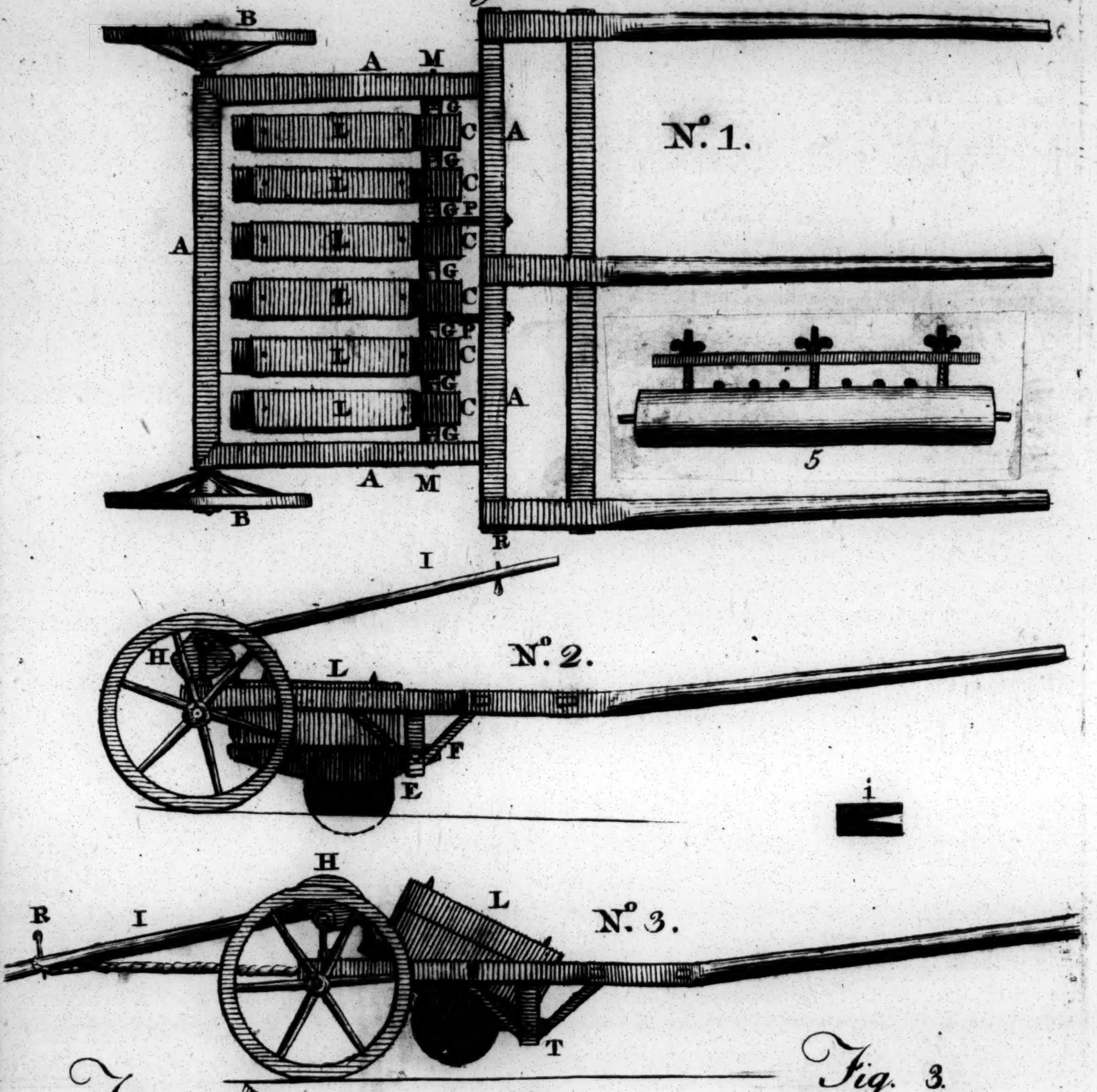


Fig. 4.

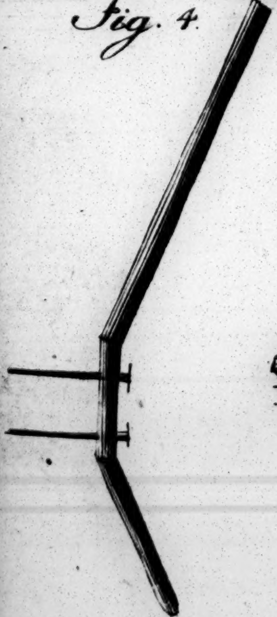


Fig. 2.

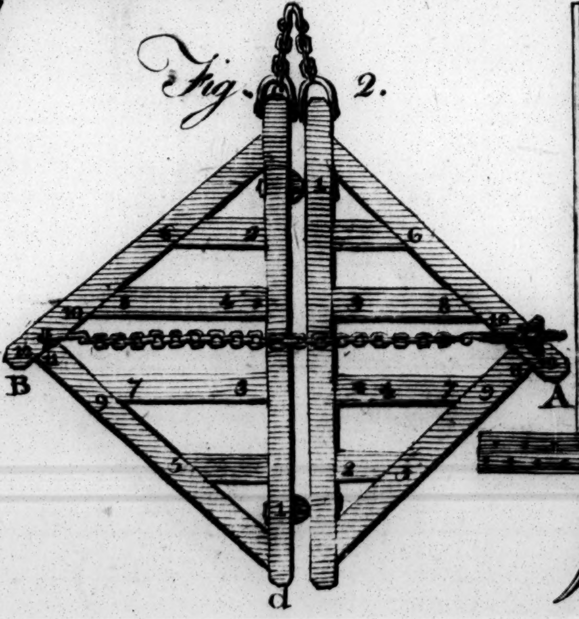
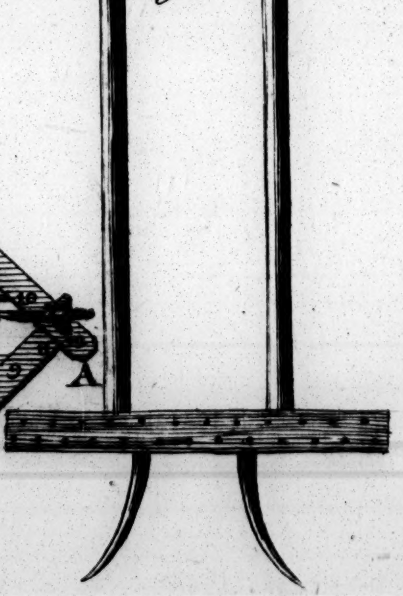


Fig. 3.



A DESCRIPTION *of the* PATENT INSTRUMENT, *called a* SWARD-CUTTER, *invented by the* Honourable ROBERT SANDILANDS, *ſome time ago, now much improved, particularly with regard to the Expence, it being reduced from L.* 15 *or L.* 16 *to L.* 5 *or L.* 6.

Fig. 1. No. 1. A. A. &c. a ſquare frame 3 feet 4 inches from the fore to the hind part, by 4 feet 3 inches, the breadth of the machine within ſide; the timber (when of fir) 4 inches ſquare, placed on two wheels B. B. 3 feet diameter, a little more or leſs, (the old fore-wheels of a chaiſe may anſwer the purpoſe) to ſupport the hind part of the machine.

C. C. &c. ſix ſtrong pieces of wood, called *bulls*, 3 feet long, 5 inches and a half broad, the thickneſs 6 inches at E, No. 2. and tapering to 3 inches at F. Into theſe bulls are fixed the cutting wheels, which are iron, 13 inches diameter, ¾ of an inch thick at the centre, about an inch diameter, for piercing holes to fix the iron axles in; from that they are to be of ſuch thickneſs, as allow the edges to be well

ſteeled.

ſteeled. Theſe wheels are fixed by two bolts going through the bulls, with eyes on one end, for the axles of the wheels to run in, and nuts and ſcrews on the other, to make them very firm by, and ſunk in the bulls to prevent their interfering with the weights L. reſting on them.

G. G. in No. 1. are hollow pieces of wood, called *thorles*, each 3½ inches long, which incloſe the bolt M. and keep the bulls C. C. at their proper diſtances, but may be made longer or ſhorter at pleaſure, as the Sward requires to be cut in larger or ſmaller pieces. They are in two pieces, and bound together, and jointed by a ſtrap of leather or cord, which allows them to be readily changed, when the cutting wheels require to be kept at more or leſs diſtance.

The iron bolt M. No. 1. goes through two pieces of wood or iron, 7 inches long, clear of the wood, ſupported by iron ſtays fixed to the frame, and through all the bulls, as at T. No. 3. it requires to be ſtrong, as the draught of the horſes terminates there.

BRITISH MUSEUM 15 APR 73

H. H. No. 2. and 3. a cylinder or ſegment of wood, 7 inches diameter, called a *rocking tree*, which goes acroſs the frame, and moves on the pivots fixed into it, one at each end, ſupported by an iron bolt, or piece of wood mortoiſed into the frame, 8 inches high, as appears in No. 2. and 3. to which 6 chains or ropes are fixed by hooks, at different diſtances, as you want your cuts, at 9, 8, 7 or 6 inches from one another, and are joined to the end of each bull, in which the cutting wheels run; ſo that when the rocking tree is turned about by the lever I. fixed in the middle of it, all the bulls, with their cutting wheels, are raiſed out of the ground at once, as in No. 3. by which means the machine may be turned, or moved from place to place with great eaſe, without any danger of ſtraining the wheels.

In place of the number of hooks formerly propoſed to fix the ropes to the rocking tree, a ſlip of wood, two inches broad, one inch thick, the length of it ſhould be fixed by three nails, with wood ſcrews at one end, and nuts and ſcrews at the other, of ſufficient ſtrength, the body

of

of the nail clear of the ſcrews about an inch, one of theſe nails placed in the middle of the rocking tree, the other two within 4 inches of the end of it, ſo as that the ropes put betwixt the rocking tree and the ſlip of wood, may be fixed firm at the diſtance wanted from each other, by ſcrewing it down upon the ropes which ought to have a knot at their end. By this method it is found, when the diſtance of the cutting wheels from each, is wanted to be varied, it ſaves a multiplicity of hooks, and is much eaſier brought to anſwer its purpoſe. See fig. 5.

N. B. The rocking tree is not delineated in No. 1. in order that the plan of the frame may be more eaſily underſtood.

L. L. No. 1, 2, 3, are weights of freeſtone, 26 inches long, 5½ inches broad, the under one 4 inches thick, the upper one of the ſame dimenſions, and 3 inches thick, which will weigh (according to the gravity of the ſtone) about 4 ſtone the under, and three the upper, all of them having two holes in them, through which iron ſpikes, firmly fixed in the bulls, paſs, in order to keep them ſteady.

When the ground is eaſily cut, the under ſtone of 4 ſtone weight may anſwer; when more difficult, the other ſtone of 3 ſtone weight may be added, ſo that every wheel may have 7 ſtone weight upon it, which has been found ſufficient for the ſtiffeſt land and tougheſt ſward the machine has ever been tried on. Caſt iron weights will anſwer fully better, but are more expenſive, which the inventor wiſhes by all means to avoid.

The lever I. No. 2. 3, which ought to be 5 feet long, muſt have a ſliding rope on it, fixed to the back part of the frame, ſo that when the cutting wheels are all taken out of the ground 3 or 4 inches, by the rocking tree's being turned partly round by the lever, the rope is then fixed to it, by putting a loop at the end of the rope over the pin R. No. 3. (it ought to be placed 3 feet 4 inches from the extremity of the lever I.) which keeps all the cutting wheels out of the ground till the machine is turned, and then by moving the loop off the pin, it ſlips back towards the frame, and the lever is gently let back to its place, as in No. 2. by which the cut-

ting

ting wheels are put into their former poſture, by the weights fixed on the bulls in which they run. The levers may be made of good tough aſh.

P. No. 1. a ſmall bolt of iron, with a hook on one end of it, (one is ſufficient) to ſtrengthen the bolt M. to be hooked on the centre of it, and joined to the frame by a nut and ſcrew.

The grooves in which the cutting wheels run, may be covered below at the hinder part with a plate of thin black iron, 6 inches long, 3 inches broad, having a ſlit in it where the wheels run, to prevent (if found neceſſary) any graſs, weeds, or ſmall ſtones from filling the grooves, and clagging the wheels; the form of which is ſeen at the letter *i.*

To the frame, as ſeen at No. 1. are fixed (for a double horſe Sward-cutter) three ſhafts, as in a waggon, of ſuch length, ſtrength, and diſtance from one another, as any workman may think proper.

For a ſingle horſe Sward-cutter (which has only four cutting wheels,) a pair of ſhafts are uſed, and may make the two ſides of the frame without any joinings.

The width of the frame, in proportion to the double horſe Sward-cutter, as four is to ſix.

It is recommended for a double horſe Sward-cutter, to have 8 bulls and wheels, that when it is uſed to reduce hard clody ſummer fallow, or land for barley, before the laſt furrow, or even after it, the whole weight (42 ſtone) employed in Sward-cutting the ſtiffeſt land and toughest Sward, may be applied to the 8 bulls then at 6 inches from one another: The 4 ſtone weights to be applied to 6 of the bulls, and two of the 3 ſtone weights to each of the additional bulls, which is thought will prove a ſufficient weight for the purpoſe, and will effectually prevent a clod, at any time, of more than ſix inches broad, from eſcaping being broke to pieces.

In the ſame manner, a ſingle horſe Sward-cutter may have 6 bulls for the above mentioned purpoſe; the 28 ſtone belonging to it, divided thus: The 4 ſtone weights to 4 of the bulls, and 2 of the 3 ſtone weights to each of the additional bulls. It was thought better to be rather minute here, than trouble the perſon employed

ployed in uſing the Sward-cutter with any calculations.

That the inſtrument may come as cheap as poſſible to the public, the Inventor is of opinion, that the expence of the two wheels and the iron axle (which is conſiderable) may be ſaved, by joining ſtrongly to the frame at S. No. 3. a piece of wood with a little curve at the extremity of it, reſembling the foot of a ſledge formerly much uſed in Scotland to carry in the corn from the field; the part of it reſting on the ground being kept 18 inches (the half diameter of the wheels) from the frame, by a ſtrong ſupport of wood.

As the two outer bulls next the frame are apt to get under it, ſo as to prevent the cutting wheels from being taken out of the ground, a thin ſlip of iron fixed to the inſide of the frame, nearly oppoſite to the back end of the bulls, of convenient length, will be found neceſſary.

It will likewiſe be found convenient to have a piece of iron, ten inches long, about half an inch broad, in the form of a chiſel at one end, at the other like a horſe ſhoe-picker, ſo as to clean the cutting wheels from any ſtuff that at times may gather about them.

A ſhort ACCOUNT of the uſes of the Inſtrument called a SWARD-CUTTER, *with the Advantages attending it, and the manner of uſing it.*

THE original intention of this machine was to prepare old graſs-ground for the plough, by cutting it acroſs the ridges, in the beginning of, or during winter, when the ground is ſoft, in order to anſwer all the purpoſes that Mr Tull propoſed by his four-coulter plough, ſo ſtrongly recommended by him for bringing graſs-ground, that has been long reſted, into tilth. This the Sward-cutter has been found to do, much more effectually and expeditiouſly, as Mr Tull's plough, with four coulters, cut the Sward in the ſame direction with the plough, and is liable, from every ſtone, or other obſtruction any of the coulters meet with, to be thrown out of its work altogether, or the inſtrument broke, to which the Sward-cutter, conſiſting of four, ſix, or more cutting wheels, is never liable, from their being entirely independent of one another, cutting the ground acroſs the ridges before plowing, and rendering that operation eaſier to two horſes, than it would be to three, without its being cut. The furrow being cut acroſs, falls finely from the plough in ſquares of any ſize required, not under ſix inches, in place of long ſlips of tough ſward, ſeldom and imperfectly broke by the four coultered plough, which requires ſix horſes, or four at leaſt, and makes it very expenſive to work with.

Any perſon who reads Mr Tull's deſcription of his four-coultered plough, and what he propoſed by it, will ſoon ſee the great advantage the Sward-cutter has over it, in producing the deſired effect of bringing old reſted graſs-ground into tilth; an object univerſally allowed to be of no ſmall importance to agriculture.

This inſtrument is very fit for preparing ground for burnbating, as it will ſave much hand-labour.

It may be properly uſed in croſs-cutting clover, of one or two years ſtanding, to prepare the ground for wheat, if the land is ſtiff and moiſt enough.

It may be applied to cutting and croſs-cutting paſture-ground, intended to have manure of any kind put upon it to meliorate the graſs. In this it will far exceed the ſcarificator, mentioned in one of Mr Young's tours, as that inſtrument is liable, as well as the four-coultered plough, to be thrown out of its work when meeting with a ſtone or other interruption. This the Sward-cutter is proof againſt, which is looked on as its greateſt excellence.

In preparing for barley, the Sward-cutter excels a roller of any kind, in reducing the large hard clods in clay land, occaſioned by a ſudden drought, after its being plowed too wet; and it is likewiſe very proper for reducing ſuch clay land, when under a ſummer-fallow. In this operation the Sward-cutter is greatly to be preferred to the cutting roller, likewiſe mentioned by Mr Young in one of his tours, from its wheels being all dependent one on another, ſo that when one is thrown out by a ſtone, three or four muſt ſhare the ſame fate: Beſides, the cutting roller has but ſeven wheels in ſix feet, and the Sward-cutter has ſix in four feet three inches, at nine inches diſtant; and, if neceſſary, may have them ſo near as ſix inches.

After old graſs-ground is cut croſs with the Sward-cutter, and plowed, it has a very uncommon and worklike appearance, from each ſquare, turned over by the plough, being raiſed up an inch or two at the ſide laſt moved by the earth-board; ſo that the field, when finiſhed, is all prettily waved, and reſembles a piece of water when blown on by a gentle breeze. By this means a very great deal of the land's ſurface is expoſed to the froſt, and other influences of the air, which cannot fail to have a good effect on it.

Two horſes are ſufficient for the draught of a double horſe Sward-cutter, and one horſe for a ſingle horſe one; one man manages the machine, and drives the horſes. He begins his operation by firſt meaſuring off twenty or thirty paces from the machine, leſs or more, as he inclines, and there fixes a pole. He then cuts the field croſs, as near

near at right angles with the ridges as he can. When the cutting wheels are paſt the laſt furrow about a yard or ſo, and the machine is upon the outmoſt ridge of the field on which it muſt turn, he muſt ſtop the horſes, then take hold of the lever I. fig. 1. No. 2. and by pulling it to him, he raiſes the cutting wheels out of the ground, which are kept ſo by the loop of the rope being put over the pin R. in the lever I. No. 3. till the machine is turned and brought to its proper place, which is done by meaſuring off the ſame diſtance formerly done on the oppoſite ſide of the field. When the cutting wheels are exactly over the outmoſt furrow, then, on the horſes being ſtopped, the rope is ſlipt off the pin R. and the lever returned to its former place, as repreſented, No. 2. which allows the weights L. L. *&c.* to force the cutting wheels into the ground again. He then goes on till the interval betwixt the firſt and ſecond ſtroke of the machine is all cut, obſerving, that if the man that ſward-cuts, leads the horſes, he makes the near one tread on the laſt mark of the ſupporting wheel, if the cuts are at nine inches from each

each other ; if at ſix inches, the near horſe muſt go a little more to the left ; if the man goes behind the machine, and drives the horſes, (which is thought the beſt way, as he ſees better how the work is going on,) he muſt follow the ſame directions. In this manner the field is to be finiſhed, after which you may begin to plow when you pleaſe.

N. B. There muſt be a pole at each ſide of the field.

It is of no conſequence whether the land to be ſward-cut is in crooked ridges, or ſtraight, in flat ridges, or in very high raiſed ridges ; ſuch as are frequently met with in Scotland. Be the ſurface ever ſo uneven, it does not ſignify, as the cutting wheels being all independent of one another, are forced by their weights into every furrow or hollow, or be the land ever ſo ſtoney, provided the ſtones are below the ſurface, it is of no conſequence.

One Sward-cutter will cut as much in one day as ſix ploughs will plow.

The land may lie ſeveral months in winter after being ſward-cut, when there is no vegetation to make the cuts grow together

gether again before it is plowed; but the ſooner it is plowed after cutting, ſo much the better, that it may have the benefit of all the winter's froſt, which makes it harrow better and eaſier at ſeed-time. From experience it is found, that the weights on the bulls ſhould be ſo heavy, as make the cutting wheels go as deep as the furrow is intended, by which means, when the land is plowed, it appears in the beautiful waves before mentioned, ſo neceſſary to expoſe much ſurface to the froſt, and promote expeditious and fine harrowing.

When the ground is harrowed, the harrows ought to go with the waves that appear after plowing, not againſt them, as by that means they are leſs apt to tear up the furrows all cut into ſquares. This needs only be attended to the two firſt tines of harrowing, as they are called.

Any common wright and ſmith may make the inſtrument. It is very ſtrong, very ſimple, and eaſily managed, and moved from place to place; and if put under cover, will laſt many years.

Fig. 2. is the plan of a harrow invented by Mr Sandilands, which he recommends in a particular manner, and to which he has given the name of the *chain and ſcrew harrow*. Its properties are, that if your ridges are high, and you wiſh to harrow them from one end to the other, by lengthening the chain (which the ſcrew commands,) the harrow, when drawn along, forms an angle downwards, and miſſes none of the curve of the ridge, ſo far as it extends, (which may be nine feet, the diſtance from A to B. The diſtance from C to D, is five feet, ſix inches.) When the crowns of the ridges have got what is thought ſufficient harrowing lengthwiſe, you ſhorten the chain by the ſcrew, which forms an angle upwards, the harrow is then drawn by the horſes, one on each ſide of the furrow, which completely harrows it, and the ſides of the ridge, if eighteen feet broad.

When you want to harrow even ground or high ridges acroſs, with the ſcrew, you can bring the harrow to be horizontal, ſo as to work as a ſolid harrow without a joint.

The

The teeth are formed and fixed in the common manner, ſquare, not in the faſhion of coulters, and are nine or ten inches below the wood, and of ſuch ſtrength as is thought the land requires. The teeth cut, or rather tear the ground at every four inches without variation, tho' ſeemingly placed irregularly, without any riſk of choking, except ſometimes at the extreme angles, where the teeth are neceſſarily near other, which may be cleaned with the greateſt eaſe, by raiſing them a little from the ground. The figures 1, 2, *&c.* point out where the 12 teeth on each ſide the harrow are placed.

Where a ſtrong brake-harrow is not neceſſary, by making the teeth ſhorter and lighter, you may have 48 teeth which will tear the ground at every two inches, or near it, cover the ſeed well, and make a fine mould. When there is 48 teeth in the harrow, it is found neceſſary to have the two angles at A B cut off ſo much as leave the ſtraight line, formed by it, one foot ſix inches long. The intention of this alteration from fig. 2. in the plate, is to prevent the teeth (which are double in number) from being too cloſe together at the angles A B, which, it is found, they would be; and in place of four bulls, as at fig. 2. it is proper to have a fifth placed at the middle of the ſtraight line, to make it firm, and to allow ſome of the teeth to be fixed in it, ſo as to keep them at a more proper diſtance from one another, to prevent them choking with large clods, &c.

It is recommended, that harrows for every purpoſe, and of any ſize, be made on the above principle, from which no tooth can ever follow the track of another, and all of them kept conſtantly acting.

Fig. 3. and 4.—the plan and profile of a harrow likewiſe invented by Mr Sandilands, called a *Wrack-harrow*, from its very expeditious manner of bringing the wrack or roots of couch-graſs and other weeds together. It conſiſts of a plank of timber, ſix feet long, nine inches broad, and two inches thick, in which there are two rows of teeth fixed, twelve in front, and thirteen in rear, about four inches row from row, and about five inches from each other, which in effect, brings the teeth to operate at 2½ inches, one from another. They are in length about ſeven inches below the wood, ¾ of an inch ſquare, not ſharp, but pointed diamond-ways, ſo as not to penetrate the ſoil, but only to catch what by preceding thorough harrowing, is brought above the ground. To the plank is joined ſhafts for a horſe, and handles for a man, of ſuch length and ſtrength as any workman may think neceſſary.

The manner of uſing the harrow is as follows: When the land is ſo well harrowed, as that all the roots of the quickens or couch-graſs, *&c.* are brought to the ſurface, the harrow is drawn acroſs the field, the holder preſſing a little (not much) on the handles, till the plank is immediately over the firſt furrow; on which, without ſtopping the horſe, he ſuddenly lifts the harrow which the ſhafts ſupport before; by this means, all the ſtuff gathered by the harrow, drops in the furrow; ſo on he muſt go; and when he has croſſed the field, he turns to the right or left, and croſſes the ridge again, as mentioned, obſerving not to miſs any of the land, keeping cloſe by the laſt track. From this operation, the whole wrack, *&c.* is left in the furrows, ready to be carted off the field, or burnt, as the farmer chuſes. If the horſe is not ſteady, a boy muſt be employed to lead him.

LIST OF SUBSCRIBERS

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Maxwell, William, Eſq; of Calderwood
Moſman, Hugh, Eſq; of Auchtyfardel
Montgomery, Colonel Hugh, of Collsfield.

O.

Orme, Alexander, Eſq; Principal Clerk of Seſſion.

P.

Pringle, Sir James, Baronet
Purves, Sir Alexander, Baronet
Paterſon-Sharp, John, Eſq; of Kirktown
Plummer, Andrew, Eſq; of Middleſteads
Pringle, James, Eſq; of Torwoodlee.

R.

Roxburgh, Duke of
Roſeberry, Earl of
Rockville, Lord
Riddel, Sir James, Baronet, of Ardnamurchan and Sunart
Riddell, T. Miles, *junior*, Eſq; of Ardnamurchan
Riddel, Charles, Eſq;
Rutherford, John, Eſq; of Edgerton
Ramſay, William, Eſq; of Barnton.

S.

Stewart-Mackenzie, Honourable James, Lord Privy Seal
Stewart, Honourable General John
Suttie, Sir James, Baronet
Stonefield, Lord
Swinton, Lord
Stewart-Moncrieff, David, Baron
Sharp, Thomas, Eſq; of Houſton
Sandilands, Matthew, Eſq; of Couſton
Smith, James, Eſq; of ———
Stewart Nicolſon, Eſq; of Carnock
Shaw-Stewart, John, Eſq; of Greenock
Sharp, Charles, Eſq; of Hoddom
Spiers, Peter, Eſq; Stirlingſhire
Scott, John, Eſq; of Malleny
Stewart, Sir James

Shettlewood, Colonel Henry, at Carwellfoot

T.

Tweeddale, Marquis of
Torphichen, Lord
Taylor, James, Eſq;

W.

Warrander, Sir Peter, Baronet
Wauchope, Andrew, Eſq; of Niddrie
Wauchope, John, Eſq; of Edmonſton
Watſon, Charles, Eſq; of Saughton
Waddell, Robert, Eſq; of Crotchell.

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List of Subſcribers ſince the foregoing was Printed.

Duke of Queenſberry
The Right Honourable William Pitt, Chancellor of the Exchequer
George Roſe, Eſq; of the Treaſury, and clerk to the Houſe of Lords
William Molliſon, Eſq; Commiſſioner of Public Accounts
Sir John Stewart of Caſtlemilk, Bart.
Sir William Miller, Bart. of Glenlee
George Douglas, Eſq; of Cavers
Sir John Clark, Bart. of Pennycuik
John Murray of Murraywheat, Eſq;
Michael Nicholſon-Stewart, Eſq; of Carnoch
Archibald Gordon, Eſq; of Haleaths
Francis Sharp, Eſq; merchant in Edinburgh.

List of thoſe who have Purchaſed without Subſcribing.

Lauderdale, Earl of
Maitland, Captain, of Cliftonhall.

N. B. Since the publication of this pamphlet, the inventor of the inſtrument, from experience, recommends the bulls (as they are called) to be made of caſt-iron, in place of wood, as they may be ſaid to be everlaſting, and are of weight, of themſelves, ſufficient to ſuperſede the ſtone weights, and the trouble of fixing them, and, being only four inches broad, can be brought ſo near each other, as to allow the cutting wheels fixed in them, to cut at every four inches, when it is found neceſſary; which may be when graſs ground is cut or ſcarified, as Mr Arthur Young and others ſtrongly recommend, when any manure is to be applied to it, when not to be broke up by the plough.

Sward-cutters, double or ſingle, with wooden bulls, or caſt-iron bulls, may be had by applying to Mr Saliſbury, carpenter, at his houſe, a little above the Edinburgh foundery, or to Meſſrs Cooper and Barker, at the foundery, eaſt-ſide of Leith-walk, where may be alſo had caſt-iron bulls with cutting wheels, and what other iron work is neceſſary: The whole, or any part wanted, to be made of the beſt materials, and at the moſt moderate prices.

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